

2. The asteroid character of the ambulacral system: the divisional plates not only being homologous with, but resembling in the manner of their disposition the ambulacral plates of Asteroidea; at the same time furnishing a highly suggestive representation of their phylogenetic development.

3. The rudimentary structure of the mouth-armature, more asteroid than ophiuroid in general facies. Absence of teeth, jaw-plates, and jaws.

4. Extension of the peritoneal cavity to the extremity of the functional portion of the rays, that is to say, to the margin of the pentagonal body.

5. The extremely rudimentary condition and aborted character of that portion of the brachial series which is prolonged beyond the body-disk.

6. The continuity of the tentacular pore-system limited to the disk only.

The above characters are clearly sufficient to stamp the peculiarity of this extraordinary echinoderm, and, whilst excluding it from any known group of genera by their remarkable nature and by the aberrant departure they present from all previous types, are such as would seem to necessitate the relegation of the form to a family apart by itself.

To speak definitely as to the exact position of intermediacy which the organism holds between the Asteroidea and Ophiuroidea would obviously be premature, without a more detailed examination of the internal anatomy than the present specimen in its dry condition will permit, as well as some knowledge of the life-history of the form. It may however be safely affirmed without overstepping the bounds of due caution, that *Astrophiura* bridges further over, from the ophiuroid side, the differences which have separated the two orders, than any previously described starfish or brittle-star.

VI. "Experimental Researches on the Temperature of the Head." Part II, III, IV. By J. S. LOMBARD, M.D., formerly Assistant Professor of Physiology in Harvard University, U.S. Communicated by H. CHARLTON BASTIAN, M.D., F.R.S., Professor of Pathological Anatomy in University College, London. Received June 18, 1878.

(Abstract.)

Part II.—*Examination of the Middle Region of the Head.*

This region is divided on each side into 7 tiers by 6 equidistant lines drawn parallel to the longitudinal median line. The tiers are

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numbered from 1 to 7 from below upwards. There are 5 districts in each lateral half, formed by 4 equidistant lines drawn parallel to the anterior and posterior boundaries.* The districts are numbered from 1 to 5 from the anterior boundary backward. Each tier measures vertically on the anterior boundary line 22·78 mm. (0·89 inch), and each district measures horizontally on the median line 16·6 mm. (0·65 inch). The ear cuts off the greater portion of the 3rd district, the whole of the 4th district, and a little of the 5th district—all in the 1st tier. The following are the principal results of the examination of the middle region:—

1st. Comparison of symmetrically situated spaces of the two sides of the head, 100 observations on each pair of spaces.

As in the case of the anterior region, every space may be higher in temperature on the right side or on the left side in turn. The following is the distribution of temperature in the *majority of cases*:—

In favour of	
<i>Left side.</i>	<i>Right side.</i>
Districts.	Districts.
1st Tier—1st,	2nd, 3rd, 5th.
2nd „ —0,	1st, 2nd, 3rd, 4th, 5th.
3rd „ —0,	1st, 2nd, 3rd, 4th, 5th.
4th „ —2nd, 3rd, 4th, 5th,	1st.
5th „ —2nd, 3rd, 4th, 5th,	1st.
6th „ —2nd, 3rd, 4th, 5th,	1st.
7th „ —2nd, 3rd, 4th, 5th,	1st.

Thus in 34 spaces a side compared, the temperature is higher on each side in 17 spaces. Taking the total number of observations, 3,400, and deducting 107 cases of equality of temperature, the following are the percentages of times of occurrence of relative superiority of temperature for the right and left sides respectively:—

Right side,—49·711. Left side,—50·289.

The following are the spaces in which equality of temperature is most generally found:—

1st Tier.	4th Tier.	5th Tier.
Districts—1st, 2nd, 3rd.	2nd, 3rd, 4th, 5th.	2nd, 3rd, 4th, 5th.
6th Tier.	7th Tier.	
Districts—2nd, 4th.	1st, 2nd.	

The following are the percentages of superiority of temperature on the right side, on the left side, and of equality of temperature,—in the total number of observations:—

Right side—48·147 per cent. Left side—48·706 per cent.
Equality—3·147 per cent.

* For the boundaries of the different regions, see Abstract, Part I.

Quantitative comparisons of the two sides.

The following is a summary of the mean results of 100 comparisons of each pair of symmetrically situated spaces.

The mean difference of temperature is very unequal on the two sides of the head; thus the mean difference for the 17 spaces, which are, on an average, higher in temperature on the right side than on the left, is 0.0589° C. (0.106° F.); while the mean difference for the 17 spaces which are of higher temperature on the left side than on the right, is 0.1103° C. (0.198° F.) The smallest differences noted are in the 4th district, 2nd tier, and 5th district, 2nd and 3rd tiers, all right side, and 5th district, 5th tier, left side; the difference in each case being 0.016° C. (0.028° F.) The greatest difference noted is in the 3rd district, 5th tier, left side, namely, 0.264° C. (0.475° F.) The extreme range of difference of temperature is therefore 0.248° C. (0.446° F.) The mean difference of temperature of all the observations taken together, irrespective of sides, is 0.087° C. (0.152° F.)

2nd.—*Comparison of spaces situated on one and the same side of the Head.*

(a.) Comparison of spaces situated in the same district of two adjoining tiers—50 observations on each pair of spaces.

*Left side.**Right side.*

1st tier, higher in temperature than 2nd tier, by 0.1206° C. (0.217° F.)	0.1093° C. (0.196° F.)
2nd tier, higher in temperature than 1st tier, in 5th district, by 0.264° C. (0.475° F.) ..	0.082° C. (0.147° F.)
2nd tier, higher in temperature than 3rd tier, by 0.158° C. (0.284° F.)	0.144° C. (0.259° F.)
3rd tier, higher in temperature than 4th tier, by 0.107° C. (0.192 F.)	0.176° C. (0.316° F.)
4th tier, higher in temperature than 5th tier, by 0.255° C. (0.459° F.)	0.22° C. (0.396° F.)
5th tier, higher in temperature than 4th tier, in 2nd district, both sides, and in 3rd district, left side, by 0.135° C. (0.244° F.) ..	0.074° C. (0.133° F.)
5th tier, higher in temperature than 6th tier, by 0.244° C. (0.439° F.)	0.227° C. (0.408 F.)
6th tier, higher in temperature than 5th tier, in 4th and 5th districts, by 0.193° C. (0.347° F.)	0.115 C. (0.207° F.)
6th tier, higher in temperature than 7th tier, by 0.106° C. (0.19° F.)	0.103° C. (0.185° F.)

(b.) Comparison of spaces situated in two adjoining districts of the same tier—50 observations on each pair of spaces.

*Left side.**Right side.*

1st district, higher in temperature than 2nd district, by 0.107° C. (0.192° F.)	0.127° C. (0.228° F.)
2nd district, higher in temperature than 1st district, in 5th tier, by 0.148° C. (0.266° F.) 0.	
2nd district, higher in temperature than 3rd district, by 0.147° C. (0.264° F.)	0.216° C. (0.388° F.)
3rd district, higher in temperature than 4th district, by 0.124° C. (0.223° F.)	0.115° C. (0.207° F.)
4th district, higher in temperature than 5th district, by 0.119° C. (0.214° F.)	0.079° C. (0.142° F.)

Part III.—*Examination of the Posterior Region of the Head.*

The posterior region is divided, on each side, into 6 tiers by 5 equidistant lines, drawn horizontally from the median line to the lateral limit. The tiers are numbered from 1 to 6 from below upward. There are 5 districts in each lateral half, formed by 4 equidistant lines drawn parallel to the median line. The districts are numbered from 1 to 5 from the median line outward. On the median line each tier measures, vertically, 21.33 mm. (0.83 inch). On a horizontal line, passing through the occipital protuberance, each district measures, horizontally, 21 mm. (0.82 inch). As in the case of the anterior region, the 5th tier wants the 5th district, and both the 4th and 5th districts are absent in the 6th tier. The following are the principal results of the examination of the posterior region :—

1st. Comparison of symmetrically situated spaces of the two sides of the head—100 observations on each pair of spaces.

As in the case of the two preceding regions, every space in the posterior region may, in turn, be of higher temperature on the right side or on the left side. The following is the distribution of temperature in the *majority of cases* :—

In favour of

<i>Left side.</i>	<i>Right side.</i>
Districts.	Districts.
1st Tier—1st.	1st Tier—2nd, 3rd, 4th, 5th.
2nd „ —1st.	2nd „ —2nd, 3rd, 4th, 5th.
3rd „ —1st, 2nd.	3rd „ —3rd, 4th, 5th.
4th „ —1st, 2nd, 3rd, 4th 5th.	
5th „ —1st, 2nd, 3rd, 4th.	
6th „ —1st, 2nd, 3rd.	

Thus, in 27 spaces a side compared, the temperature is higher on the left side in 16 spaces, and on the right side in 11 spaces. Taking the total number of observations, 2,700, and deducting 80 cases of equality of temperature, the following are the percentages of times of

occurrence of relative superiority of temperature for the right and left sides, respectively: Right side, 45·458. Left side, 54·542. The following are the spaces in which equality of temperature is most commonly found:—

1st Tier.	2nd Tier.	3rd Tier.	4th Tier.
Districts—1st, 2nd.	1st, 2nd.	2nd, 3rd, 4th.	2nd, 3rd, 4th, 5th.

The following are the percentages of superiority of temperature on the right side, on the left side, and of equality of temperature in the total number of observations:—

Right side—44·112 per cent. Left side—52·926 per cent.

Equality—2·962.

Quantitative comparisons of the two sides.

The following is a summary of the mean results of 100 comparisons of each pair of symmetrically situated spaces.

There is a marked difference in the values representing the mean differences of temperature in favour of the right and left sides respectively; thus, the mean difference of temperature for the 11 spaces which are, as a rule, in favour of the right side, is 0·186° C. (0·334° F.); while the mean difference of temperature of the 16 spaces which are generally in favour of the left side, is 0·066° C. (0·118° F.). The greatest difference noted is in the 4th district, 3rd tier, right side, namely, 0·386° C. (0·694° F.). The smallest difference noted is in the 2nd district, 4th tier, left side, namely, 0·008° C. (0·0144° F.). The extreme range of difference of temperature is 0·378° C. (0·68° F.). The mean difference of temperature of all the observations taken together, irrespective of sides, is 0·115° C. (0·207° F.).

2nd.—Comparison of spaces situated on one and the same side of the Head.

(a.) Comparison of spaces situated in the same district of adjoining tiers—50 observations on each pair of spaces.

<i>Left side.</i>	<i>Right side.</i>
1st tier, higher in temperature than 2nd tier, by 0·112° C. (0·201° F.)	0·103° C. (0·185° F.)
2nd tier, higher in temperature than 1st tier, in 4th and 5th districts, by 0·062° C. (0·111° F.)	0·0725° C. (0·13° F.)
2nd tier, higher in temperature than 3rd tier, by 0·204° C. (0·368° F.)	0·157° C. (0·282° F.)
4th tier, higher in temperature than 3rd tier, by 0·302° C. (0·543° F.)	0·345° C. (0·621° F.)
3rd tier, higher in temperature than 4th tier, in 3rd and 5th districts, by 0·	0·085° C. (0·153° F.)

*Left side.**Right side.*

4th tier, higher in temperature than 5th tier,
by $0\cdot261^{\circ}$ C. ($0\cdot47^{\circ}$ F.) $0\cdot284^{\circ}$ C. ($0\cdot512^{\circ}$ F.)

5th tier, higher in temperature than 6th tier,
by $0\cdot086^{\circ}$ C. ($0\cdot155^{\circ}$ F.) $0\cdot135^{\circ}$ C. ($0\cdot243^{\circ}$ F.)

(b.) Comparison of spaces situated in two adjoining districts of the same tier—50 observations on each pair of spaces.

*Left side.**Right side.*

1st district, higher in temperature than 2nd district, in 1st, 2nd, and 3rd tiers, left side, and in 3rd and 6th tiers, right side, by $0\cdot072^{\circ}$ C. ($0\cdot129^{\circ}$ F.) $0\cdot065^{\circ}$ C. ($0\cdot117^{\circ}$ F.)

Remainder of 2nd district, higher in temperature than remainder of 1st district, by $0\cdot065^{\circ}$ C. ($0\cdot117^{\circ}$ F.) $0\cdot076^{\circ}$ C. ($0\cdot136^{\circ}$ F.)

2nd district, higher in temperature than 3rd district, in 3rd tier, left side, and in 4th, 5th, and 6th tiers, both sides, by $0\cdot162^{\circ}$ C. ($0\cdot291^{\circ}$ F.) $0\cdot2^{\circ}$ C. ($0\cdot36^{\circ}$ F.)

Remainder of 3rd district, higher in temperature than remainder of 2nd district, by $0\cdot035^{\circ}$ C. ($0\cdot063^{\circ}$ F.) $0\cdot141^{\circ}$ C. ($0\cdot243^{\circ}$ F.)

3rd district, higher in temperature than 4th district, in 1st and 3rd tiers, both sides, and in 2nd and 5th tiers, left side, by $0\cdot112^{\circ}$ C. ($0\cdot201^{\circ}$ F.) $0\cdot043^{\circ}$ C. ($0\cdot077^{\circ}$ F.)

Remainder of 4th district higher in temperature than remainder of 3rd district, by $0\cdot084^{\circ}$ C. ($0\cdot151^{\circ}$ F.) $0\cdot047^{\circ}$ C. ($0\cdot084^{\circ}$ F.)

4th district, higher in temperature than 5th district, by $0\cdot113^{\circ}$ C. ($0\cdot203^{\circ}$ F.) $0\cdot14^{\circ}$ C. ($0\cdot252^{\circ}$ F.)

5th district, higher in temperature than 4th district, in 3rd tier, left side, by $0\cdot125^{\circ}$ C. ($0\cdot225^{\circ}$ F.) 0

Part IV.—*On the effect of intellectual and emotional activity on the temperature of the Head.*

(a.) *Intellectual work.*

The following is a summary of the principal results:—

1st. Intellectual work causes a rise of temperature in all three regions of the head.

2nd. The rapidity and degree of this rise is different in the different regions.

3rd. Different kinds of work in one and the same person, produce

elevations of temperature differing from each other both in rapidity of appearance and degree.

4th. The kind of work which affects one region in the greatest degree affects all three regions most.

The anterior region shows, as a rule, both the most rapid and the highest rise of temperature. The middle region comes next and the posterior last. A notable exception to the above order is found, however, in the 1st district (and sometimes the 2nd district) of the 3rd, 4th, and 5th tiers of the middle region. In these spaces, the middle region often shows a greater rise of temperature than that exhibited by a considerable part of the anterior region. The average rise of temperature for each region is as follows:—Anterior region, 0.02625° C. (0.04725° F.) Middle region, 0.02062° C. (0.03711° F.) Posterior region, 0.01743° C. (0.03137° F.)

5th. Intellectual work, as a rule, causes a greater rise of temperature on the left side of the head than on the right side: but in a certain number of cases the rise is either greater on the right side or is equal on the two sides. The following are the average percentages of times of occurrence of greater rise of temperature on the left side and on the right side, and of equal rise on the two sides, together with the mean difference of rise in favour of each side:—

Anterior Region.

	<i>Left side.</i>		<i>Right side.</i>		<i>Equality.</i>
Average percentage of } cases in favour of . . }	75	..	15.625	..	9.375
Average difference of } rise of temperature }	0.00606° C. (0.0109° F.)	..	0.00295° C. (0.00531° F.)		

Middle Region.

	<i>Left side.</i>		<i>Right side.</i>		<i>Equality.</i>
Average percentage of } cases in favour of . . }	62.5	..	21.875	..	15.625
Average difference of } rise of temperature }	0.00496° C. (0.00892° F.)	..	0.00225° C. (0.0045° F.)		

Posterior Region.

	<i>Left side.</i>		<i>Right side.</i>		<i>Equality.</i>
Average percentage of } cases in favour of . . }	56.25	..	15.625	..	28.125
Average difference of } rise of temperature }	0.00231° C. (0.00415° F.)	..	0.00162° C. (0.00291° F.)		

In some individuals, after severe and prolonged work, or after work of an exciting character, not very prolonged, the rise of temperature on the left side of the head may be sufficient to cause almost the whole of the anterior region to be of higher temperature on this side.

Alterations in the same direction, but less common and less marked, may also occur in the middle and posterior regions.

(b.) *Emotional Activity.*

The following results have been obtained by the recitation of poetry or prose of an emotional character:—

1st. Emotional activity, of the kind specified, causes a rise of temperature in all three regions; this rise is, moreover, more rapid and of greater degree than that seen in intellectual work.

2nd. Less difference exists between different regions in the rapidity and degree of rise of temperature in emotional activity than in intellectual work; but the order of the regions, as regards their comparative degrees of rise of temperature, is usually the same in the two cases. The average rise of temperature for each region is as follows:—Anterior region, 0.036° C. (0.0648° F.); middle region, 0.0345° C. (0.0621° F.); posterior region, 0.033° C. (0.0594° F.) Recitation to oneself produces, as a rule, a greater effect than recitation aloud. This result is in accordance with physical laws, a portion of the heat produced being, in recitation aloud, consumed in exterior work.

3rd. In emotional activity, as in intellectual work, the left side of the head is generally more affected than the right side. The average percentages of times of occurrence of greater rise of temperature on the left side and on the right side, and of equal rise on the two sides, together with the mean difference of rise in favour of each side, are as follow:—

Anterior Region.

	<i>Left side.</i>		<i>Right side.</i>		<i>Equality.</i>
Average percentage of cases in favour of .. }	77.5	..	17.5	..	5
Average difference of rise of temperature }	0.0075° C. (0.0135° F.)	..	0.00573° C. (0.01035° F.)		

Middle Region.

	<i>Left side.</i>		<i>Right side.</i>		<i>Equality.</i>
Average percentage of cases in favour of .. }	62.5	..	20	..	17.5
Average difference of rise in temperature }	0.00562° C. (0.0116° F.)	..	0.00462° C. (0.00831° F.)		

Posterior Region.

	<i>Left side.</i>		<i>Right side.</i>		<i>Equality.</i>
Average percentage of cases in favour of .. }	55	..	20	..	25
Average difference of rise of temperature }	0.00437° C. (0.00786° F.)	..	0.00387° C. (0.00696° F.)		

Emotional activity, of the kind we have been considering, often extends very decidedly the tract of superior temperature on the left side of all three regions.

The effect of anger, in a moderate degree, after the intensity of passion has subsided, has been usually to increase the extent of the tract of superior temperature on the left side, in all three regions. Vexation and mental irritability cause a rise of temperature, most marked in the anterior region and in the anterior spaces of the middle region; the left side is most affected.

VII. "Note on the Effect of various Substances in Destroying the Activity of Cobra Poison." By T. LAUDER BRUNTON, M.D., F.R.S., and Sir JOSEPH FAYRER, K.C.S.I., M.D., F.R.S.
Received June 20, 1878.

In a paper, read some time ago before this Society, by Mr. Pedler, he mentioned his discovery of the fact that the activity of cobra poison was completely destroyed by admixture with perchloride of platinum. This substance, however, could only be regarded as a chemical and not as a physiological antidote to the poison, inasmuch as it had no power to modify or prevent the action of the venom after its absorption into the blood. Mr. Pedler expressed his opinion that the proper method of pursuing the investigation was to investigate separately the action of platinum salts and of cobra poison upon the animal body. In the discussion which followed we stated that the method proposed by Mr. Pedler was in the present instance not likely to lead to any results, and that as the action of the substance employed by him was in all probability due to its simply forming an insoluble compound with the cobra poison and not to any action of the platinum *per se*, certain other metallic salts would have a similar action to the perchloride of platinum. Experiments have confirmed the opinion we then expressed,* and we find the action of chloride of gold is precisely similar to that of perchloride of platinum, the cobra venom being rendered entirely inert by admixture with the gold salt before its injection into the body. Chloride of gold, however, like perchloride of platinum, is merely a chemical antidote, and does not modify the action of the venom after its absorption into the circulation. Permanganate of potash, which has been recommended as an antidote, also destroys its activity completely. Chloride of zinc, chloride of mercury, nitrate of silver, and carbolic acid all diminish the activity of the poison, and prolong life when mixed with it before its injection; but they do not prevent death, nor do they prolong life to any great extent. Perchloride of iron has very much

* The Poison of the Cobra, by A. W. Blyth, M.R.C.S. "The Analyst," 28th February, 1877, p. 204.